

## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

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PATENT NO. : 6,893,599  
APPLICATION NO.: 10/777,567  
ISSUE DATE : January 10, 2006  
INVENTOR(S) : Craig Young, et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Please replace claims 1-14 with the following claims 1-14:

1. A turbine engine combustor member at a combustor interior and including at least one surface exposed directly to combustion of fuel within the combustor interior comprising:  
a member body made of an alloy based on at least one element selected from the group consisting of Fe, Co, and Ni having an alloy high temperature operating capability within a temperature range of about 1300 - 2300° F, and properties comprising a combination of resistance to hot corrosion and to oxidation within the temperature range, the properties including:
  - a) a hot corrosion resistance as defined and measured by a depth of attack on an alloy surface of less than about 0.01 inch, after exposure to about 2 parts per million sea salt in a gaseous medium, cycled in a temperature range of about 1500 - 1700° F for about 1000 hours; and,
  - b) an oxidation resistance as defined and measured by an alloy surface loss of less than 0.001 inch after cyclic testing for about 120 hours in an oxidizing gas stream at a velocity of about Mach 1 for about 20 cycles per hour from ambient to about 2150° F;the member body including a member body inner first surface exposed to the combustor interior and the combustion of fuel; and, a member body outer second surface not exposed directly to the combustor interior; the member body inner first surface including thereon a high temperature environmental resistant coating comprising a ceramic-base thermal barrier coating; the member body outer second surface being substantially uncoated.
2. The combustor member of claim 1 in which the coating is a coating system comprising an inner coating including Al on the member body inner first surface, and the ceramic-base thermal barrier coating is an outer coating on the inner coating.
3. The combustor member of claim 2 in which the inner coating comprises MCrAl in which M is at least one element selected from the group consisting of Fe, Co, and Ni.
4. The combustor member of claim 3 in which the inner coating comprises a plurality of layers including:  
a first layer on the member body inner surface having a first microstructure of a first density in the range of about 90 - 100 % and a first surface roughness in the range of about 50 - 200 microinches; and,  
a second layer on the first layer having a second microstructure of a second density in the range of about 60 - 90 % and a second surface roughness in the range of about 300 - 800 microinches.

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5. The combustor of claim 2 in which the inner coating comprises PtAl.
6. The combustor member of claim 1 in which the alloy is a Ni base alloy comprising, in weight percent, from about 1 to about 3 rhenium, from about 6 to about 9 aluminum, from about 4 to about 6 tantalum, from about 12.5 to about 15 chromium, from about 3 to about 10 cobalt, and from about 2 to about 5 tungsten, with the balance essentially Ni and impurities.
7. The combustor member of claim 1 in which the member is selected from the group consisting of deflectors, splash plates, center bodies, swirlers and combustor liners.
8. A turbine engine combustor member at a combustor interior and including at least one surface exposed directly to combustion of fuel within the combustor interior comprising:  
a member body made of an alloy based on at least one element selected from the group consisting of Fe, Co, and Ni having an alloy high temperature operating capability within a temperature range of about 1300 - 2300° F, and properties comprising a combination of resistance to hot corrosion and to oxidation within the temperature range, the properties including:
  - a) a hot corrosion resistance as defined and measured by a depth of attack on an alloy surface of less than about 0.01 inch, after exposure to about 2 parts per million sea salt in a gaseous medium, cycled in a temperature range of about 1500 - 1700° F for about 1000 hours; and,
  - b) an oxidation resistance as defined and measured by an alloy surface loss of less than 0.001 inch after cyclic testing for about 120 hours in an oxidizing gas stream at a velocity of about Mach 1 for about 20 cycles per hour from ambient to about 2150° F;the member body including a member body inner first surface exposed to the combustor interior and the combustion of fuel, and a member body outer second surface not exposed directly to the combustor interior; the member body including therethrough air cooling passages to pass cooling air from the member body outer second surface to the member body inner first surface;  
the member body inner and outer surfaces being substantially uncoated.
9. The combustor member of claim 8 in which the member body outer second surface defines at least in part a member hollow interior.
10. The combustor member of claim 9 in which the member is selected from the group consisting of combustor center bodies and combustor liners.

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

11. In a method for making a turbine engine combustor assembly, the steps of:  
providing a plurality of turbine engine combustor members for assembly at a combustor interior and including at least one surface exposed directly to combustion of fuel within the combustor interior, each member including a member body made of an alloy based on at least one element selected from the group consisting of Fe, Co, and Ni having an alloy high temperature operating capability within a temperature range of about 1300 - 2300° F, and properties comprising a combination of resistance to hot corrosion and to oxidation within the temperature range, the properties including:

- a) a hot corrosion resistance as defined and measured by a depth of attack on an alloy surface of less than about 0.01 inch, after exposure to about 2 parts per million sea salt in a gaseous medium, cycled in a temperature range of about 1500 - 1700° F for about 1000 hours; and,
  - b) an oxidation resistance as defined and measured by an alloy surface loss of less than 0.001 inch after cyclic testing for about 120 hours in an oxidizing gas stream at a velocity of about Mach 1 for about 20 cycles per hour from ambient to about 2150° F;
- the member body including a member body inner first surface for exposure to the combustor interior and the combustion of fuel, and a member body outer second surface not exposed directly to the combustor interior, the member body inner and outer surfaces being substantially uncoated;  
assembling the plurality of members into a combustor with the inner first surfaces exposed to the combustor interior;  
applying to the assembled inner first surfaces a high temperature environmental resistant coating using an air spray coating method that coats all of the assembled inner first surfaces substantially concurrently.

12. The method of claim 11 in which applying the high temperature coating comprises a plurality of steps including:

- applying an inner coating including Al disposed on the member body inner first surfaces; and then,
- applying a ceramic-base thermal barrier coating on the inner coating.

13. The method of claim 12 in which the inner coating comprises MCrAl in which M is at least one element selected from the group consisting of Fe, Co, and Ni and the ceramic base coating is zirconia stabilized with yttria.

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14. The method of claim 13 in which the inner coating comprises a plurality of layers including:  
a first layer on the member body inner surface having a first microstructure of a first density in the range of about 90 – 100 % and a first surface roughness in the range of about 50 – 200 microinches; and,  
a second layer on the first layer having a second microstructure of a second density in the range of about 60 – 90 % and a second surface roughness in the range of about 300 – 800 microinches.

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